CLAY AND CONCRETE ROOF TILE MATERIALS AND APPLICATION

IR 15-2

Reference: 2001 Title 24, Part 2, CBC Sections 702A , 704A.1.2, 1507.1, and 1507.7
2007 Title 24, Part 2, CBC Sections 702A , 704A.1.2, 1507.3, and 1511.1
DSA IR 15-1 *Attachment of Clay or Concrete "S" Roof Tile*
ASTM C1167-03 and C1492-03

Issued 10-15-07

Discipline: Structural

This Interpretation of Regulations (IR) is intended for use by the Division of the State Architect (DSA) staff, and as a resource for design professionals, to promote more uniform statewide criteria for plan review and construction inspection of projects within the jurisdiction of DSA, which include State of California public elementary and secondary schools (grades K-12), community colleges, and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

This IR is reviewed on a regular basis and is subject to revision at any time. Please check the DSA web site for currently effective IR's. Only IR's listed in the document at http://www.dsa.dgs.ca.gov/Pubs/default.htm (click on "DSA Interpretations of Regulations Manual") at the time of plan submittal to DSA are considered applicable.

1. Purpose: The purpose of this Interpretation of Regulations (IR) is to clarify the acceptance and test requirements for all tile roof covering materials and anchorage systems, including mechanical and foam adhesive attachment systems. This IR also specifies installation, testing and inspection requirements for these systems.

2. Background:

Applicable requirements for roof tile materials and installation in the California Building Code (CBC) include:

- **2001 CBC:** Section 1507 and UBC Standard 15-5.
- **2007 CBC:** Section 1507.3, ASTM C1167-03 and ASTM C1492-03.

For newer materials and installation methods not included in the above CBC requirements, the provisions of this IR apply.

3. Material Qualifications - Tile:

3.1 Qualification by Listing: Roof tile may be qualified and accepted if the roof tile has a DSA recognized listing or evaluation report that indicates compliance with ICC AC-180, *Acceptance Criteria for Clay and Concrete Roof Tiles*. See Section 8 of this IR for DSA recognized listings or evaluation reports.

3.2 Qualification by Project Specific Testing: Provide test documentation for each project to show compliance with:

- UBC Standard 15-5 for projects governed by the 2001 CBC, or
- ASTM C1167-03 for clay tiles, or C1492-03 for concrete tiles for projects governed by the 2007 CBC.

4. Mechanically Attached Systems: Roof tile system utilizing mechanical devices or fasteners for attachment shall comply with one of the following requirements:

- **2001 CBC:** Section 1507.7.1,
- **2007 CBC:** Section 1507.3, or
- **DSA IR 15-1** for clay or concrete S-tiles

4.1 Alternate Systems: Mechanical attachment systems that are not prescribed by the CBC may be accepted if they have a DSA recognized listing or evaluation report for the entire system or for each component of the system. See Section 8 of this IR for DSA recognized listings or evaluation reports.

The listing or evaluation report shall indicate compliance with the following criteria:

- Tiles: See Section 3.1 of this IR.
- Underlayments: ICC ES AC-188, *Acceptance Criteria for Roof Underlayment* or (in areas described in Section 6.1 of this IR) ICC ES AC-48, *Acceptance Criteria for Roof Underlayments for Use in Severe Climate Conditions*.
- Installation: See Section 6 of this IR.
- Inspection: See Section 7 of this IR.

4.2 Fasteners: Shall be copper, brass or stainless steel per 2001 CBC Section 1507.1.1.1, or 2007 CBC Section 1511.1.

***Exception**:*

Fasteners complying with ASTM A-153 Class D or ASTM B-695 Class 50 coatings may be used in non-coastal areas and when allowed by a DSA recognized listing or evaluation report. Non-coastal areas are areas at a distance of one mile or greater from any body of salt water.

5. Roof System with Adhesive Attachment: Roof systems that utilize foam adhesive for attachment may be accepted under the alternate materials and methods provisions of Title 24, Part 1 (California Building Standards Administrative Code), Section 4-304. Such systems shall have a DSA recognized listing or evaluation report that indicates compliance with ICC ES AC-152, *Acceptance Criteria for Adhesive Attachment of Concrete or Clay Tiles*. See Section 8 of this IR for DSA recognized listings or evaluation reports.

The listing or evaluation report shall indicate compliance with the following criteria:

- Underlayments: ICC ES AC-48, *Acceptance Criteria for Roof Underlayments for Use in Severe Climate Conditions*
- Installation: See Section 6 of this IR.
- Inspection: See Section 7 of this IR.

6. Installation for Listed Roof Systems: The roof structure must be able to support the anticipated vertical and lateral loads of the tiles as required by the CBC. Only qualified or certified installers and applicators may install roof tiles. Installation of roof tiles shall meet all of the following requirements:

- *Tile Roofing Institute's Installation Manual for Moderate Climate Regions*, which is also approved by ICC-ES, and known as ESR-2015P,
- Installation provisions of the tile evaluation report, and
- Tile and tile anchorage systems manufacturers' recommendations.

6.1 Cold Weather Regions: Cold weather regions are areas where ice damming may occur or where roof snow load is 150 psf or greater. In such areas installation must conform with the following:

- The *Standard Installation Guides for Concrete and Clay Roof Tile in Cold Weather Applications*, published by the National Tile Roofing Manufacturers Association, Inc. (NTRMA)/ Western States Roofing Contractors Association (WSRCA);
- ESR-2015P;
- Follow the instructions in the applicable evaluation reports;
- Manufacturer's recommendations.

If clay tiles are used in the cold weather regions, the designer shall specify Grade 1 clay tiles per ASTM C1167-03.

6.2 Wildland Urban Interface Area: Where tile roofing is installed in areas designated as a Wildland Urban Interface area as defined in the 2001 or 2007 CBC Section 702A, or where the site conditions warrant, roof covering shall be constructed to prevent the "intrusion of flames and embers" in accordance with the 2001 or 2007 CBC Chapter 7A, Section 704A.1.

7. Inspection and Testing: The project inspector shall verify that the tile roof covering materials meet the requirements of Sections 3, 4 and 5 of this IR, and inspect the installation of the tile roof covering systems. The project inspector shall also verify that all installers and applicators are certified either by the manufacturer or the Roof Tile Institute, as required in the applicable evaluation report.

7.1 Pull Test for Adhesive Systems: In addition to the above requirements, for adhesive tile attachment systems a vertical upward pull force of 35 pounds shall be applied to the nose edge of randomly chosen tiles for a duration of five seconds. Test one tile per square of roofing area. If any tiles fail the pull test, test the four adjacent tiles.

A simple method to perform the pull test is to slip an L-shaped hook under nose edge of the tile and attach the hook to a fish scale.

The pull test must be performed or witnessed by the project inspector.

8. Recognized Listings: DSA recognized listings include the following:

- ICC ES Evaluation Report (ESR) or
- Miami-Dade County Notice of Acceptance (NOA) or
- Other evaluation reports meeting the requirements and conditions of DSA IR-A5

9. Reroofing: Reroofing of an existing roof-covering system with a clay or concrete tile system shall comply with CBC Section 1510, and ESR 2015P (see Section 6 above). "Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered…" (CBC Section 1510.2). Substantial increase in roof load can be expected if the original roof-covering system was not a clay or concrete tile system.